

# INFLATION AND ECONOMIC GROWTH IN IMPERIAL BRAZIL (1824-1889) \*

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## Abstract

Drawing on 20,000 monthly quotations, this study revises imperial Brazil's inflation and living standards estimates. The new price index eliminates the nineteenth century 'low growth puzzle'. Brazil's GDP per capita rose in line with the Latin-American average. Earlier series, which relied on baskets disproportionately weighted toward agricultural goods or whose composition varied over time, display continuous growth and overstate inflation by 57–270%. The revised index reveals a sharp rise in the 1850s and stability thereafter. New evidence on exchange and freight rates, terms of trade, regional commerce, and real wages shows that regional specialization in food production helped stabilize prices after the mid-century.

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Latin America's post-independence economic history often centers on why the region fell behind (Haber and Klein 1997; Prados De La Escosura 2009). For Brazil, the prevailing view is that the economy was stagnant before 1850 and grew only slowly afterward, yet direct evidence is scarce. The Maddison Project provides no direct income figures for the early nineteenth century; instead, historians project GDP per capita backward from a 1920 benchmark and use series of wages (for Rio de Janeiro), government spending, and foreign-trade data to reach 1850 (Goldsmith 1986; Molinder, Pereira, and Prado 2022, 252). For earlier decades they simply assume, following Nathaniel Leff hypothesis, that growth was zero (Leff 1972). As a result, the credibility of the entire narrative depends on the accuracy of the price index.

The problem is that Brazil's price indices diverge sharply from the international pattern. Even the most conservative figures show cumulative inflation of 181 percent between 1824 and 1889 (Buescu 1973). This is puzzling, as countries like the United States, Spain, and Britain had little inflation in the nineteenth century, and other nations with reliable estimates generally recorded stable or falling prices after 1870 (Ljungberg 2025). To explain this anomaly, Nathaniel Leff attributed Brazil's nineteenth-century inflation to the inelasticity of its food supply (Leff 1997, 43). For him, this 'feature' of the Brazilian economy had significant welfare costs, including increased uncertainty and reduced investments. Consequently, the effects of inflation came to symbolize Brazil's economic backwardness during the nineteenth century.

Table 1 shows that, beyond its persistent inflation, Brazil's growth rate also marks it as an outlier. However, an annual income growth of only 0.3 percent after 1850 clashes with anthropometric evidence showing better living conditions in southeastern Brazil after the 1870s (Franken 2019). It is surprising that a country enjoying an almost unbroken coffee export boom from the 1840s to the end of the Empire recorded virtually no growth, especially compared to its neighbors.

This paper argues that Brazil's reputedly slow nineteenth-century growth originates from problems associated with existing price indices, which have been largely ignored

Table 1. GDP per capita estimates (1850–1889)

Date	Argentina	Brazil	Chile	Colombia	Uruguay	USA
1850	1994	867	1352	784	2467	3632
1889	4288	991	2708	1149	4112	6706
Avg. growth	2.0%	0.3% (1.2%)*	1.8%	1.0%	1.3%	1.6%

Source: Maddison Project database, 2023.

Note: \* new estimate from this paper: 1.2% per year.

in the historiography (Haddad and Versiani 1990, 148). Using a new monthly price series for 20 commodities in Rio de Janeiro (1824-1889), alongside exchange rates, freights, real wages, and terms of trade data, it is possible to reassess the imperial-era economy. With the revised price index, GDP per capita increased about 1.2 percent a year from 1850 to 1889, on par with other Latin American countries. The revision results from the fact that, contrary to earlier indices, prices did not rise steadily. They were stable in the 1830s-40s and 1860s-80s, increasing rapidly only in the 1850s after the slave trade ended. The next sections examine how this labor-supply shock influenced prices.

Conventional indices for imperial Brazil overstate inflation because they omit widely consumed manufactures such as cotton textiles. Prices for these imports declined as industrial productivity rose and maritime freight costs fell. The new series likewise shows no sustained rise in agricultural prices between 1824 and 1889. One of the reasons for this discrepancy is that earlier studies employed baskets with fewer products and had fewer observations, distorting inflation trends. Consistent evidence from Rio de Janeiro, Pernambuco, and Bahia confirms that food prices did not show a continuous upward pattern.

Constructing a nineteenth-century price index without household budget surveys inevitably invites criticism. However, the absence of household budget surveys was typical of most nations during the nineteenth century and existing series for imperial Brazil either lack weights for different products or apply weights from twentieth-century surveys. What matters, however, is the index’s sensitivity to such choices,

i.e. how different baskets shift the overall trend. The index presented here is unique: it covers the entire 1824–89 period, compares multiple consumption baskets, and provides price data for individual products (see the online Appendix).

Following a broad discussion of seven price indices that cover the nineteenth century, Luis Catão's (1992) work lays the foundation for constructing a new index. His index is noteworthy as it is the only one that combines annual prices for agricultural and manufactured products with census-based weights, yet it begins only in 1870. To extend coverage to the full imperial period, this study draws on monthly newspaper quotations from 1824–1889 to recalculate Catão's index across the entire era. This new database comprises over 20 thousand observations, including retail prices for cotton textiles, absent in previous studies.

The main results hold even though Catão's weights come from the 1919 census and may not reflect nineteenth-century consumption. Using randomly weighted baskets, the price index yields similar results, notably capturing the sharp rise in food prices during the 1850s. These findings are consistent with qualitative information and align when using different baskets from previous research with the prices collected for this study.

The new dataset also permits an estimate of the period's terms of trade. Earlier studies relied on official prices, set by the government for tariff assessment, or on export prices recorded at foreign ports, neither of which necessarily reflected true market values. The new figures reveal a marked improvement in Brazil's terms of trade from the 1840s onward, driven by booming coffee exports and declining import prices. This finding matches evidence of rising per-capita GDP and new data showing that skilled workers' real wages began to rise in the first half of the century, a period the literature usually labels stagnant (Prados De La Escosura 2009).

## 1 A Brief History of Price Indices for Brazil

Oliver Ónody (1960) produced the first price index for nineteenth-century Brazil, covering foodstuffs, textiles, and various raw materials. His series is limited, however: it uses no fixed consumer basket, simply averages quoted prices, and offers data for only nine benchmark years (1829, 1834, 1844, 1857, 1860, 1874, 1881, 1887, 1896). The earliest figures (1829 and 1834) come from the *pauta das avaliações*, official tariff valuations issued at long intervals, while later observations rely on similar customs assessments, none of which necessarily reflect prevailing market prices (Ónody 1960, 26).

Ónody's series, despite its flaws, was influential because Contador and Haddad (1975) used it to estimate Brazil's real income from 1861 onward. Because Ónody offered observations for only five years between 1860 and 1900, they filled the gaps with a purchasing-power-parity adjustment based on England's price index and the Brazilian exchange rate, imposing this PPP series on a linear trend interpolated through Ónody's data (Contador and Haddad 1975).

The next nineteenth-century series is Eulália Lobo's. Drawing on primary sources from Santa Casa da Misericórdia, Ordem Terceira de São Francisco da Penitência and, after 1840, the *Jornal do Commercio*, she presents prices for nine products: beef jerky, black beans, butter, codfish, coffee, rice, sugar, and manioc and wheat flour. Lobo standardized the sources by assuming that prices from institutions, due to long-term supply contracts, were lower than those from newspapers. As a result, she only considered the lowest quotation in newspapers (Lobo et al. 1971, 241). Coverage is uneven: between 1825 and 1841 the basket ranges from three to seven items, and it is unclear whether monthly observations are available for the whole period.

Lobo assigned different weights to the nine goods for 1856, 1919, and 1949, according to their share in household budgets. For the 1856 basket she used early-nineteenth-century travel accounts (e.g., John Luccock), an 1829 statute specifying rations for

slaves who worked at the Public Treasury and timber cutters at the Navy Arsenal, and an 1865 survey of food consumption among Rio's low-income residents. These sources include agricultural and domestic slaves, hire-out "worker slaves," free Brazilian and foreign laborers, and lower-grade public employees.

Lobo's 1919 weights rely on Leo Affonseca's cost-of-living surveys for Rio de Janeiro in 1893, 1914, and 1919. Affonseca, the director of commercial statistics at the Ministry of Finance, collected data on 22 food items plus housing, fuel, utilities, and clothing, "basic necessities" for a seven-person household. This yields a basket suited to families of comfortable means when compared with U.S. budgets. His work, likely the first systematic study of early-Republic price movements, was commissioned by Japan to measure living-cost increases affecting immigrants (Affonseca Junior 1920, 3). Lobo's third benchmark (1949) adopts weights from a Fundação Getulio Vargas study of higher-income urban workers.

Table 2 shows marked differences among Lobo's three benchmarks, especially the 1856 basket, where beef jerky, black beans, manioc flour, and rice account for 86.7 percent of total outlays. A further contrast is the substitution from manioc to wheat, reflecting the growing importance of wheat bread by the twentieth century. Applying these weights to the 1824–1889 period, prices multiplied by 30 with the 1856 weights, by 10 with the 1919 weights, and by 13 with the 1949 weights. Because a thirty-fold rise is implausible and the 1949 basket is chronologically remote, scholars usually favor the 1919 weights for nineteenth-century research (Peláez and Suzigan 1981, 46). However, as shown below, subsequent researchers have misread Lobo's method, producing analysis that distort Brazil's economic past.

Mircea Buescu (1973) compiled a third index, covering fifteen scattered years between 1826 and 1887 and drawing on *Gazeta do Rio de Janeiro* and *Jornal do Commercio*. Although his series lists more commodities than Lobo's, it suffers from two major flaws: it lacks a fixed consumer basket, and the mix of goods changes from one observation year to the next. Each annual figure is therefore just the simple aver-

Table 2. Products and weights of Lobo’s indices

Products	1856 (%)	1919 (%)	1949 (%)	Affonseca (1919) (9 out of 22) (%)
beef jerky	16,80	11,68	7,14	4,85
black beans	20,93	2,23	9,52	5,83
butter	0,00	21,03	14,30	2,91
codfish	2,28	5,26	4,76	1,94
coffee	3,40	4,87	9,52	2,43
manioc flour	37,62	2,04	4,76	0,97
rice	11,34	8,41	11,90	8,74
sugar	1,98	15,48	9,52	14,56
wheat flour	5,65	29,00	28,58	4,85
Total	100,00	100,00	100,00	47,09

Source: Lobo (1971), Affonseca (1920).

age of whichever agricultural, manufactured, import, or export prices happens to be quoted. The IBGE’s historical-statistics compendium rightly labels Buescu’s index “methodologically weak ” (Haddad and Versiani 1990, 149).

Buescu broke the imperial era into five sampling windows. In the first, 1826–38, he listed 23 quotations, 21 of them export commodities, but only 12 truly distinct goods once variants (e.g., “inferior” vs. “ordinary” sugar) are merged. In the next window, 1838–50, the roster expands to 128 quotations, 98 for imports. Between 1850 and 1870 Buescu lists 75 distinct goods (102 with variants), yet only 55 appear in every sampled year. Prices are recorded for just two dates in the 1860s, leaving the critical years (1864–69) of the War of the Triple Alliance uncovered. Coverage thins further in the last two windows: 25 mainly food items for 1870–80 and 42 largely imported manufactures (beer, candles, cement, coal, kerosene) for 1880–87. These imports generally fell in price, leading to a different pattern compared to earlier decades.

The most recent price index in terms of publication date is from Luis Catão (1992), who compiled average prices for 30 products from *Jornal do Comercio* between 1870 and 1913. The annual price represents the average price quotation for March, July, September, and December. One significant advantage of Catão’s price index is the

use of weights from the 1919 production census, giving broad sectoral coverage and making it the preferred deflator for aggregate output. Because it reflects producer rather than consumer costs, however, it is less useful for analyzing real wages.

Table 3 highlights the two broad categories of Catão's index, which, unlike Lobo's, includes manufactured goods. In the "industry" category, capital goods and cotton textiles constitute 41.3 percent of the weights, yet both series draw on British rather than Brazilian data. Textile prices are UK Board of Trade FOB unit values, converted to mil-réis and adjusted to CIF; capital-goods prices come from Charles Feinstein's UK series (Feinstein 1976).

Table 3. Catão's index weights

Agriculture (45%)	%	Industry (55%)	%	Industry	%
corn	37,90	textile	27,75	tar	1,10
sugarcane	12,72	wheat flour *	8,52	grease	0,80
rice	12,19	beer	5,46	butter	0,67
beans	10,34	sugar *	5,30	<u>capital goods</u>	13,57
wheat	7,59	manioc flour *	3,92	<u>cigarettes</u>	5,61
coffee	6,22	leather skins	3,20	<u>kerosene</u>	4,10
cotton	4,16	dried meat	2,90	<u>cement</u>	3,15
manioc	3,30	brandy (aguardente)	2,42	<u>matches</u>	2,30
tobacco	2,96	cod fish	2,39	<u>pasta</u>	0,75
<u>pinewood</u>	1,08	wine	2,38		
<u>mate-tea</u>	0,85	rice proc *	1,46		
<u>cocoa</u>	0,69	lard	1,45		
<u>rubber</u>	0,00	coffee proc *	1,30		

Notes: Products with an \* have the same price as in the agriculture category. Products that are underlined do not have price information in newspapers before 1870.

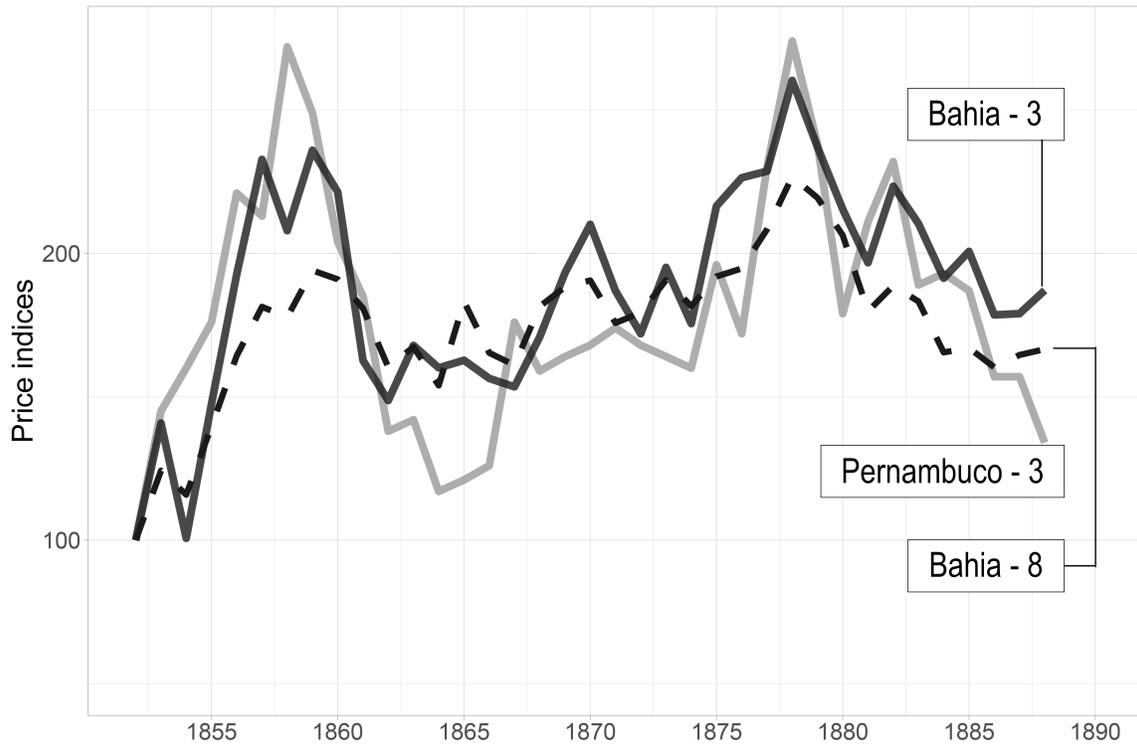
A few lesser-used indices also warrant mention. Raymond Goldsmith (1986, 30), in revising Contador and Haddad's real-income series, averaged the indices of Buescu, Lobo, Ónody, and another by Dorival Vieira. Vieira's own index, which he considers a 'rough and only approximate' measure of inflation, weights the nine main export commodities in the official trade statistics for 1851-1895 (Vieira 1962, 329). Including the Lobo and Vieira indices in the overall average therefore overstates inflation for the

period. Still, Goldsmith’s composite remains influential as the principal deflator for Brazil’s GDP-per-capita estimates in the Maddison Project (Prados De La Escosura 2009).

Two regional indices cover the Brazilian Northeast (Mattoso 1973; Eisenberg 1974). Peter Eisenberg uses Pernambuco data (1852–88) to price a subsistence ration of 400 g manioc flour, 200 g beef jerky, and 125 g black beans. Kátia Mattoso builds an unweighted index for 15 goods, based on five-year moving averages from Santa Casa da Misericórdia accounts in Bahia. However, Mattoso’s underlying figures are absent from her cited sources; only graphs are provided, and their coarse scales (dates marked at 50-year intervals) prevent recovery of exact values (Mattoso 1978, 347).

Using the original data that Mattoso supplied to Eustáquio Reis (available at IPEA-DATA), I reconstructed her index and compared it with Eisenberg’s Pernambuco series (see Figure 1). The “Bahia – 3” line applies Eisenberg’s subsistence basket (manioc flour, beef jerky, and black beans) to Mattoso’s prices. “Bahia – 8” broadens the basket to eight items: manioc flour (200 g), beef jerky (100 g), black beans (150 g), beef (100 g), wheat flour (200 g), codfish (100 g), rice (100 g), and bacon (100 g). This mixed, unweighted basket retains Mattoso’s original scope while approximating Pernambuco’s consumption pattern. Adjusting these weights or quantities does not impact the long-run trend. Figure 1 yields two main insights. First, short-term volatility partly reflects the limited size of the baskets and indices with more items trace smoother paths. Second, none of the series shows a continuous rise and all three decline in the 1880s.

Figure 1. Price indices for Pernambuco and Bahia (1852-1888), 1852 = 100



Sources: Eisenberg (1973, p.154); Mattoso (1978); IPEADATA.

Notes: Basket with three products (manioc flour, beef jerky, and black beans).

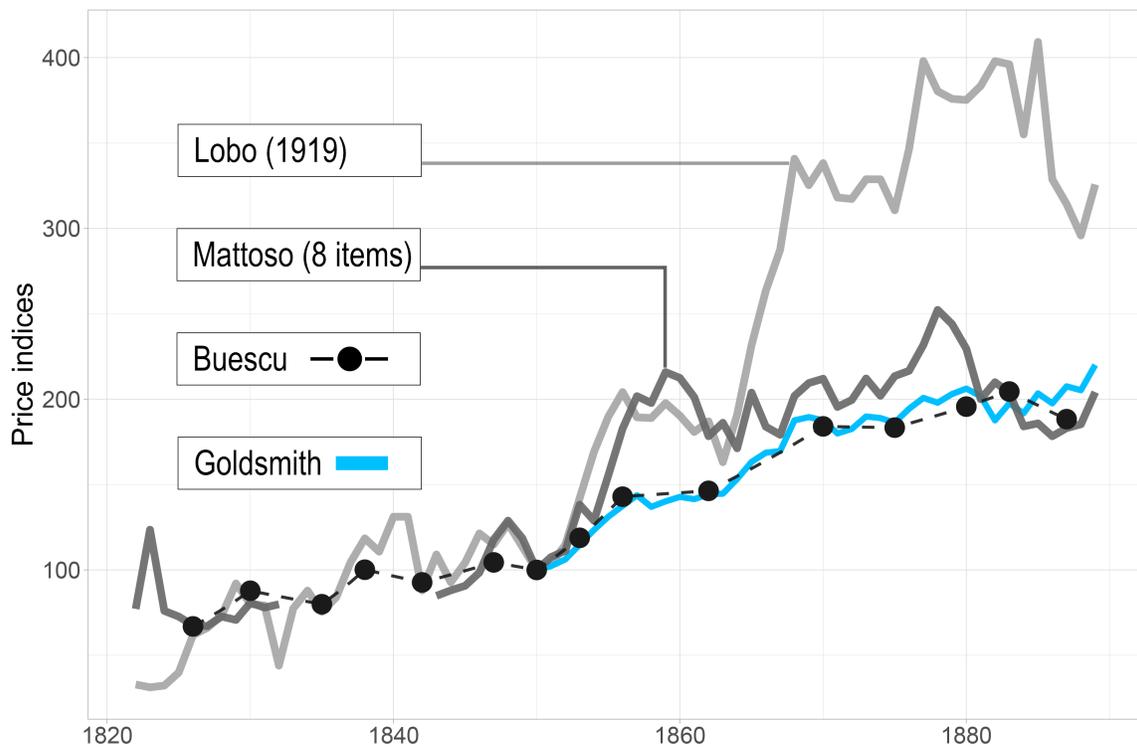
Basket with eight (manioc flour, beef jerky, black beans, beef, wheat flour, codfish, rice, and bacon).

Of the seven indices reviewed, most scholars deflate prices with the Buescu, Catão, or Lobo series. The others rely on indirect data (Ónody, Contador-Haddad), cover only a few goods (Eisenberg), or merge existing indices (Goldsmith). Mattoso’s index is rarely used because she did not publish the underlying figures and because Salvador is viewed as unrepresentative of national price trends. However, the literature offers no evidence that Rio de Janeiro’s price structure mirrored the rest of the country either.

The choice of index also often turns on coverage. Only Buescu, Lobo, and Mattoso supply data before 1850, and of these three, only Lobo provides an unbroken annual

series for the entire imperial era (Mattoso has no observations for 1833–42). However, as Figure 2 shows, even with Lobo’s least inflationary weighting scheme (1919), her index sits well above the others, especially after 1864, the start of the War of the Triple Alliance (Lobo et al. 1971, 247). Appendix B explains why this index diverges so markedly from the others and why it should not be used to deflate data over extended periods.

Figure 2. Price indices from Buescu, Goldsmith, Lobo, and Mattoso (1822-89). 1850 = 100



Sources: See text.

Goldsmith’s index closely mirrors Buescu’s, despite averaging three additional series. Figure 2 reveals two conflicting long-term patterns: Buescu’s near-continuous growth after 1850 versus Mattoso’s sharp rise in the 1850s followed by stability. Possible explanations include differences in basket size (much smaller for Mattoso), the in-

clusion of manufactured goods, regional disparities (Bahia versus Rio), or Buescu's varying product selection across periods. These factors are explored in the next section. Catão's index, beginning only in 1870, is excluded here and discussed separately below.

## 2 A New Price Index

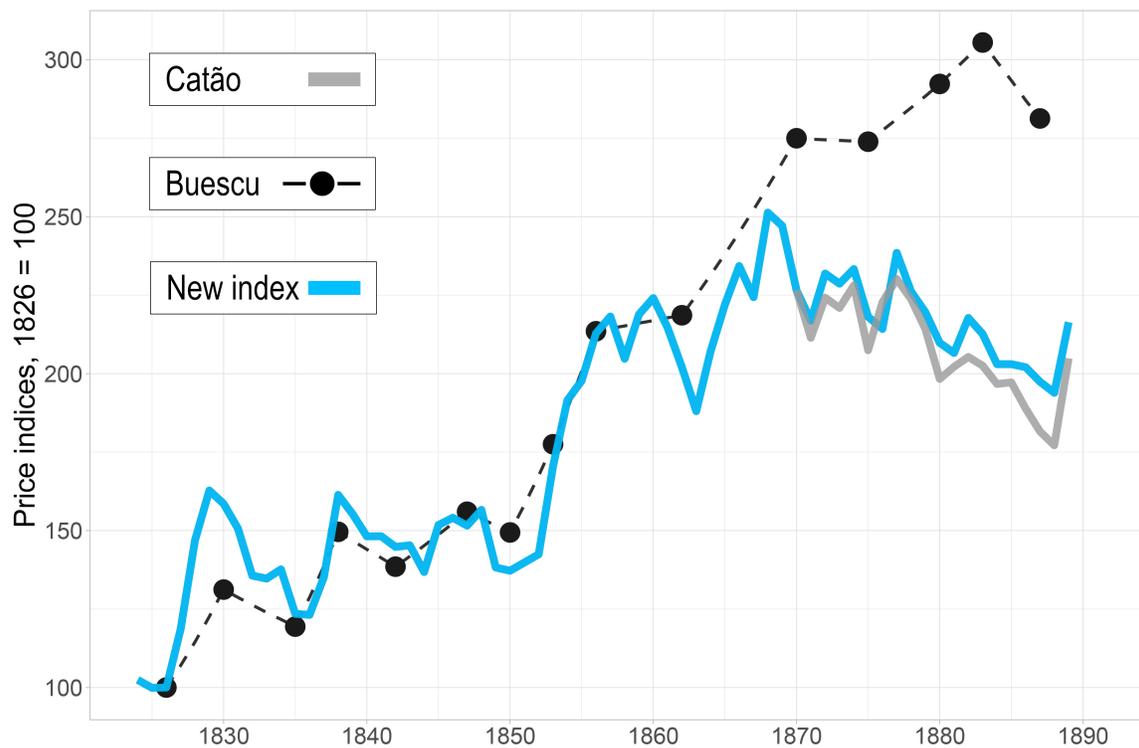
Before Catão's 1992 paper, all indices shared the limitation of lacking price data for imported and manufactured goods (Peláez and Suzigan 1981, 158). Researchers, therefore, relied on indirect methods to estimate these prices. Joseph Sweigart, for example, built an index for imported raw materials and manufactured goods using data from Brazil's three main trading partners (France, Britain, and the United States) from 1850 to 1888. His results indicated rising capital-goods prices during the first two decades, followed by declines in the 1870s and 1880s (Sweigart 1987). Given Britain's predominance in Brazilian trade, Sweigart's index closely mirrors Leff's purchasing-power-parity index, derived from British inflation and exchange rates (Leff 1972).

Although Catão's research addressed many shortcomings of earlier indices, it covers only the late nineteenth century. Researchers interested in earlier periods have been limited to Lobo's inflation-overstating index or Buescu's simple averages of varying products. Therefore, this section recalculates Catão's basket for the entire imperial era (1824–89), using monthly price data primarily from *Diário do Rio de Janeiro* (1820s–30s) and *Jornal do Commercio* thereafter, supplemented by other newspapers as necessary.

Missing observations were linearly interpolated, though the raw data in the online Appendix excludes these interpolations to ensure transparency and enable future refinement. Another group of products (cement, cigarettes, kerosene, matches, and pasta) only appears in newspapers after 1870 and is thus excluded from the new

1824–1889 index. I also excluded ‘capital goods’ because this category uses information for Britain that is unavailable for the period before the 1860s. To partially compensate for this omission (representing 7.46 percent of the total index), I collected monthly prices for cotton textiles, Brazil’s most significant import, accounting for roughly 30 percent of foreign goods imports between 1846 and 1867, according to Ministry of Finance reports. There is also evidence that this pattern did not change significantly before or after this period (Pereira 2021; Versiani 1980, 7; Denslow 1987, 138). The second largest import, wheat flour, represented just 5.8 percent, highlighting cotton’s importance. These exclusions and sampling differences (Catão recorded prices only four months per year) explain the divergence between the original (grey) and revised (blue) indices in Figure 3.

Figure 3. Price indices (1824-89)



Sources: see text.

The new index in Figure 3 reveals no sustained inflation after the 1850s and shows a notable price decline towards the end of the imperial era, contrasting with previous indices for Rio de Janeiro As in Bahia, price rises were concentrated in the 1850s. Pinto (2014, 281) likewise records food and land-price increases in Minas Gerais in the late 1850s. Additionally, there was moderate inflation during the War of the Triple Alliance (1864–70), but significantly less severe than the fluctuations depicted by Buescu’s and Lobo’s indices, which thus overstate the war’s domestic economic impact.

Another difference emerges in the 1870s. Buescu shows prices rising from 100 in 1870 to 106 in 1880, while the new index declines from 100 to 88. This discrepancy results partly from Buescu’s own acknowledgment that his data for this decade are “unpretentious and precarious” (Buescu 1973, 195). In his 1870 basket, 24 of the 25 items were foodstuffs, goods that typically experienced larger price increases than manufactured products (Sweigart 1987, 235). By 1880, data coverage shrinks to just 12 products, disproportionately influenced by sharp rises in coffee and dried meat prices. These factors highlight significant limitations in Buescu’s index at the end of the imperial period.

Before analyzing the drivers of the 1850s price surge, we must address potential bias from Catão’s weighting. For example, he assigns 55 percent of the index to the ‘industry’ category, yet Brazilian industrialization only took off during the 1890s. As Catão himself warns, the industrial and agricultural weight shares “underwent dramatic changes” and should not be assumed representative of the pre-1914 period. For him, a more appropriate proxy is therefore needed (Catão 1992, 526).

Still, the division between ‘agriculture’ and ‘industry’ is less rigid than it initially seems. The ‘industry’ category includes several processed foods commonly found in historical consumption baskets, such as butter, codfish, dried meat, wheat flour, and manioc flour. Moreover, products like coffee, rice, sugar, wheat and manioc flour appear in the *Jornal do Commercio* only in processed forms, rather than as

raw agricultural goods. Since Catão does not clearly explain how he handled these overlaps, I assume identical price data are used for both categories. Given that prices are converted into indices relative to a base year, level differences with identical trends would not influence overall index results. After removing products lacking data before 1870, the only purely industrial (non-food-related) goods remaining are leather skins, tar, and textiles.

Another concern with extending Catão's basket back to 1824–1889 is that some products have disproportionately large weights, such as corn, which alone represents 17 percent ( $37.9 \times 0.45$ , Table 3) of the basket. Consequently, price trends, such as the sharp rise in the 1850s or the decline between 1875 and 1889, might be driven by a few heavily weighted goods. To assess how sensitive the results are to Catão's weights, I recalculated the index using randomly assigned weights for various product groups (see Appendix F). Despite these adjustments, the findings remain consistent.

Table 4 presents an alternative approach that analyses each product group separately. For imports I use the annual shares from the reports of the Ministry of Finance, and the values in parentheses represent the averages for the entire period. The reports indicate that the five most important imports in the port of Rio de Janeiro between 1846 and 1867, when data are available, were cotton manufactures, wheat flour, wine, hardware (ferragens), codfish, and butter. Therefore, the first row does not add up to 100 percent because it reports each product's average share in Brazil's actual import basket. The other three rows, which do total 100 percent, present simulated weights to demonstrate that the results remain robust to changes in the consumption basket.

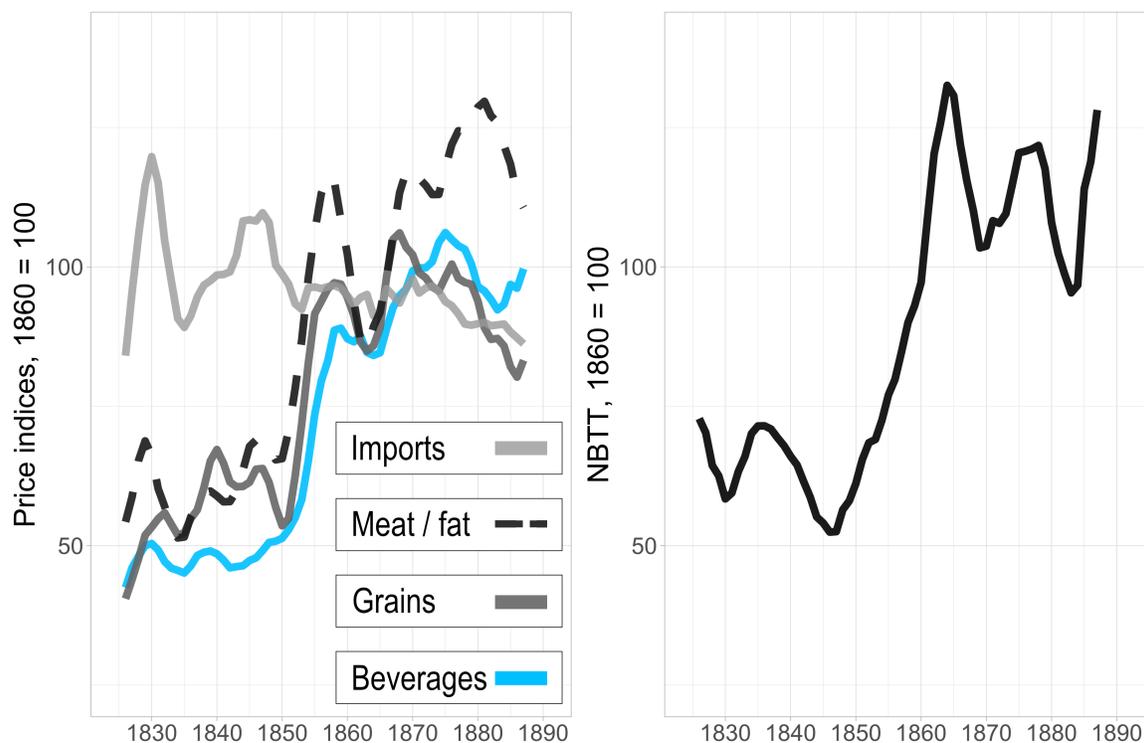
Table 4. Weights for different groups of consumption goods

<b>Imports (relative to total value)</b>				
Cotton textiles (30%)	Wheat (5,7%)	Wine (5,2%)	Codfish (1,9%)	Butter (1,9%)
<b>Meat / fat</b>				
Beef jerky (40%)	Butter (10%)	Codfish (15%)	Grease (15%)	Lard/bacon (20%)
<b>Grains</b>				
Beans (20%)	Corn (20%)	Manioc flour (20%)	Rice (20%)	Wheat (20%)
<b>Beverages</b>				
Brandy (10%)	Coffee (30%)	Sugar (30%)	Tobacco (15%)	Wine (15%)

Sources: For imports, Table F2 in the appendix.

Figure 4 (left) shows that meat, grains, and beverages/tobacco all register sharp increases in the early 1850s, dip in the mid-1860s, and then fall steadily from the 1870s. The importance of manufactured goods becomes clear, as the absence of cotton textiles leads to overestimating inflation rates. Moreover, the late-Empire price decline matches both a fall in average freight rates (see last section) and the global price decline, sharper for agricultural than industrial goods, after 1873 (Flandreau 1996, 879).

Figure 4. Price indices for different groups and Net Barter Terms of Trade (NBTT), 1824-1889



Notes: 5-year moving averages.

Despite falling global commodity prices after the 1870s, Brazil's terms of trade did not fall during the late nineteenth century. Figure 4 (right) plots net barter terms of trade (NBTT) calculated annually using trade weights that account for changing trade composition. The export index covers coffee, cotton, sugar, and hides, products averaging 71 percent of Imperial exports, while the import index includes goods listed in Table 4. Earlier estimates relied on official import values or foreign-port FOB prices, which poorly reflected actual import costs.

Trade stagnation in the first half of the nineteenth century mirrored patterns in Argentina, Mexico, and Cuba. Still, the new NBTT series likewise corroborates earlier studies showing that Brazil's terms of trade did not decline over the century

(Salvucci and Salvucci 2000). Moreover, contrary to claims that Latin American export growth left incomes unaffected, the real wage estimates in the next sections show that the coffee boom after the 1840s increased earnings in Brazil's southeast (Bulmer-Thomas 2003, 78).

### 3 Why did prices increase during the 1850s?

The substantial price increase in the 1850s was widely debated in Brazil. Newspapers and parliamentary discussions attributed food scarcity to adverse weather, transportation costs, and especially the end of the transatlantic slave trade in 1850. The halt in slave imports triggered a supply shock, nearly doubling average slave prices in Rio de Janeiro during the decade (Mello 1977, 50).

A document reflecting widespread concern over rising prices is the 1858 government inquiry into food scarcity, considered “perhaps the most serious issue” at the time. Although all foodstuffs faced shortages, particular worry centered on staples such as corn, beans, cassava and corn flour, dried meat, and bacon, which formed the ‘basis of most people’s diets’ [p.5]. One rapporteur, Caetano Furquim de Almeida, identified the main cause as the shift of enslaved laborers toward more profitable sectors following their price surge after the slave trade’s abolition. Farmers, unable to reduce labor allocated to primary export crops, cut production on corn, beans, cassava, and potato fields.<sup>1</sup> This reallocation explains why export prices were not immediately affected by the end of the slave trade.

Parliamentary debates echoed the explanations for rising prices. Deputy (and future Finance Minister) Francisco de Salles Torres-Homem argued that the dwindling supply of enslaved labor forced large plantations nationwide to draw workers away from small food farms, driving up staple prices.<sup>2</sup> Likewise, Rio de Janeiro’s vice-president

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<sup>1</sup>Official Publications: Relatório Vice-Presidente, Rio de Janeiro, 1858, anexo K.

<sup>2</sup>Official Publications: Annaes do Parlamento Brasileiro, sessão 12 de junho de 1857, p.234.

noted that, in the 1850s, both large and small producers switched to coffee, then the only crop capable of sustaining high slave prices and daily wages.<sup>3</sup>

During the 1850s, Sebastião Soares argued in *Jornal do Commercio* that key export crops, like coffee, cotton, and sugar, expanded their production, proving there was no labor shortage for them. He also noted that planters' focus on these lucrative exports displaced small-scale cultivation of farinaceous and leguminous staples (Soares 1865, 1:XX). Consistent with Figures 3 and 4, Soares documented that the prices of seven principal staples (rice, sugar, dried meat, manioc flour, beans, corn, and bacon) doubled between 1852 and 1858.<sup>4</sup>

The reallocation of labor to export staples happened because the interprovincial slave trade could not meet new demands for workers in the short term. Soares notes just 3430 slaves moved from northern provinces to Rio de Janeiro annually between 1852 and 1859, compared with roughly 33000 arriving per year via the African trade in the 1840s (Soares 1865, 1:228).<sup>5</sup> Even if the provincial slave trade, due to taxation, was underreported, these internal transfers were insufficient, forcing planters to shift workers across sectors in the absence of large-scale immigration (Braga Da Fonseca et al. 2023). Only in the early 1870s did interprovincial transfers to the southeast accelerate. Robert Slenes estimates some 200 000 relocations from 1850 to 1888, half between 1873 and 1881, after which new import duties all but ended arrivals at Santos and Rio's ports (R. Slenes 1976, 123).

It is noteworthy that slaves arriving from the Northeast seldom came directly from sugar plantations. Even as Bahia's sugar sector stagnated in the 1860s, indebted smallholders supplied many field hands, and large plantations in Bahia employed

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<sup>3</sup>Official Publications: Relatório do Vice-Presidente, Rio de Janeiro. 1857, p.54.

<sup>4</sup>BNA FO 881/917 [Published in the *Jornal do Commercio* S. F. Soares], p.16. Sebastião Ferreira Soares, "BRAZIL: Report. Cultivation of Cotton" July 23, 1861, FO 881/1003, The National Archives, Kew.

<sup>5</sup>These numbers are similar to those reported by the British Minister to Rio de Janeiro, W. D. Christie, in 1865. See Notes on Brazilian Questions, p.93. Disembarkation estimates for southeast Brazil from the Slave Voyages Project.

substantial numbers of enslaved workers until abolition in 1888 (Barickman 1996, 586; Graham 2005, 297). Rising food prices also shifted labor toward larger non-export activities. In Paraíba, enslaved people were reallocated from smallholders to major cattle ranchers and diversified cash-crop farms (R. Slenes 2005). Slave concentrations in these regions remained high at least through the 1870s.

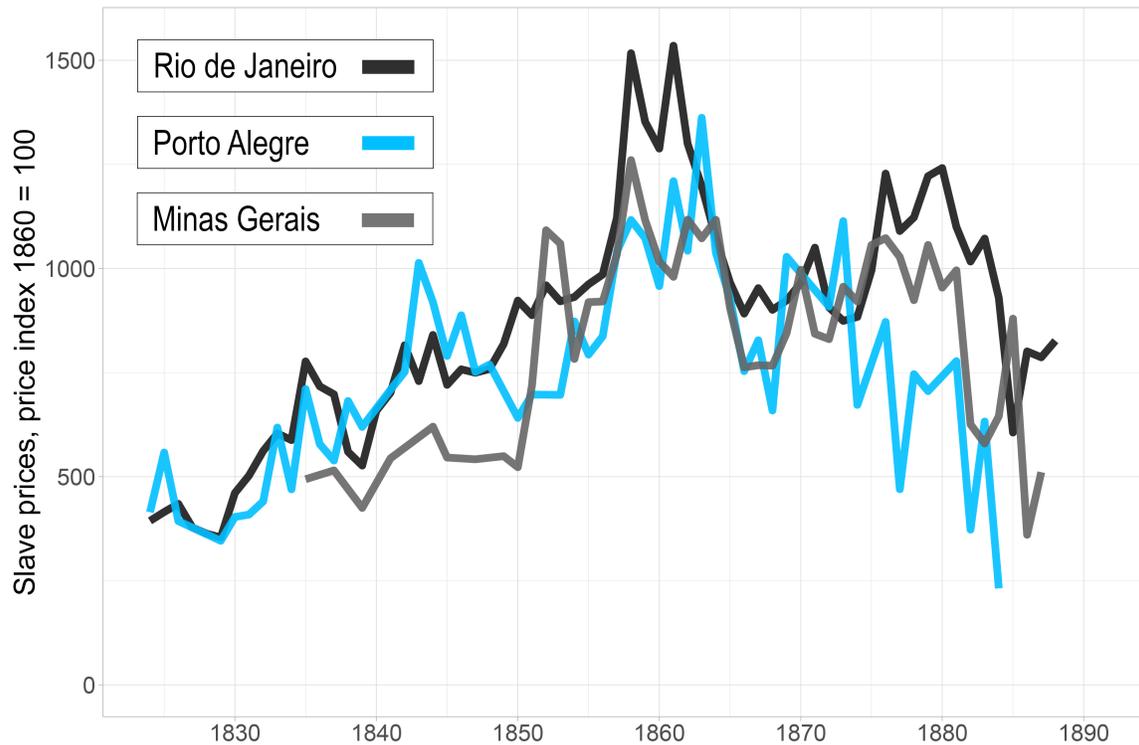
The end of the transatlantic trade also triggered a steady decline in urban slavery. Herbert Klein's data for Rio de Janeiro (from 1852) reveal that skilled, urbanized slaves were disproportionately funnelled into the internal trade, leading to a 53 per cent drop in the city's enslaved population between 1864 and 1874 (Klein 1971, 574; Graham 2005, 299). Likewise, Robert Slenes (2005, 337) shows that, in 1854, 59 percent of slaves removed from Bahia (with known origins) came from urban areas.

Mass relocations of enslaved workers and the stabilization of their prices after the 1850s confirm that Brazil's labour market rebounded quickly from the transatlantic trade's end. Robert Slenes shows that, once sugar prices are divided by slave-labour costs, they showed little variation, evidence that planters faced no shortage of "bondspeople" (R. Slenes 2005, 334). Nathaniel Leff reached the same conclusion for coffee, arguing that real labour costs for coffee producers did not rise between 1835 and 1888. Leff's only caveat was the lack of 'an annual index of consumer prices that could be used to deflate the nominal slave price and rental series in order to assess rigorously the time trend in real consumption wages for coffee workers' (Leff 1997, 37).

Figure 5 deflates nominal slave-price series for Rio de Janeiro, Minas Gerais, and Porto Alegre using the new index. The city of Porto Alegre, Rio Grande do Sul, is included because its port began exporting large amounts of food to Rio de Janeiro after 1850. Porto Alegre's data, like Carvalho de Mello's Rio series, covers enslaved men and women aged 17–49; in Minas Gerais, the series covers those aged 15–40, accounting for its higher average. Real slave prices increased until the early 1860s, in line with contemporary reports of labour reallocations across sectors. The price trends are also consistent with data for Bahia, Pernambuco and the coffee region of

Rio Claro, in São Paulo (Dean 1976, 55; Noguero1, Versiani, and Vergolino 2016, 266; Andrade 1988, 207).

Figure 5. Slave prices deflated by the new price index

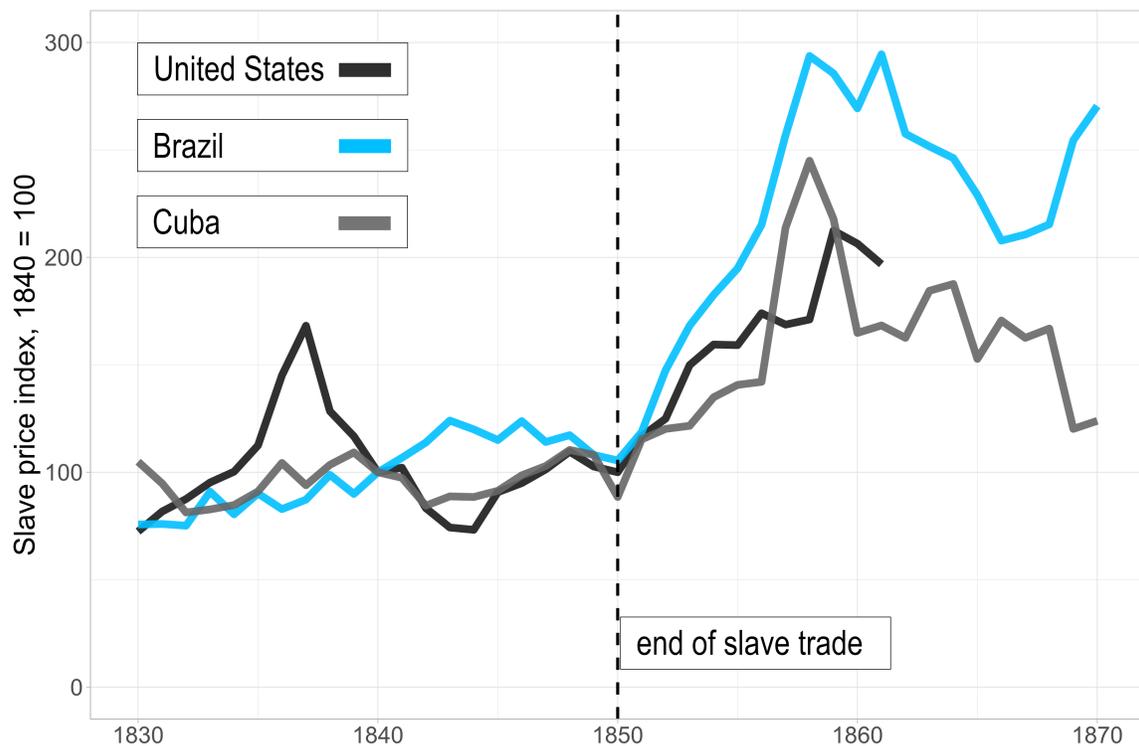


Sources: Rio de Janeiro: Mello (1977, p.50); Minas Gerais: Bergad (1999, p.268); Rio Grande do Sul, Porto Alegre (Noguero1, 2016).

Figure 5 also shows a momentary decline in slave prices across Brazilian regions around 1865, coinciding with the end of the US Civil War. This reference to the North American conflict reflects how emancipation in the southern states also depressed Cuban slave prices. Furthermore, slave prices in Cuba and the US South increased rapidly during the 1850s as well (Figure 6) (Bergad, Garc1a, and Barcia 1995, 159). Thus, these patterns warrant some caution in attributing the entirety of the price increase in Brazil during the 1850s to the end of the transatlantic trade (Fraginals, Klein, and Engerman 1983, 1209).

The likely reason for the rise in slave prices in regions that did not abolish the transatlantic trade in 1850 was Britain’s 1846 repeal of the Corn Laws. British shift to free trade drove up global commodity prices, including Brazilian coffee, whose exports expanded by 36 percent and more than doubled in value during the 1850s (Eisenberg 1974, 9). Cuba’s sugar exports also increased by 30 percent during the 1850s price surge, which drove up Cuban slave prices. Yet because Cuba’s steepest price jump came only after 1855, Bergad concedes that the 1850 closure of Brazil’s slave trade was “in part responsible for the short-term rise in slave prices between 1851 and 1852” (Bergad, García, and Barcia 1995, 59). Even as Brazil’s sugar export volume stagnated, its sterling value rose sharply in the late 1850s, and in some regions, like Pernambuco, sugar output grew 17 percent (Eisenberg 1974, 9; Denslow 1987, 9).

Figure 6. Nominal slave prices in Brazil, Cuba, and the United States (1830-1870)



Sources: Brazil: see text (average of Rio de Janeiro, Porto Alegre, and Minas Gerais); Cuba: Bergad, García, and Barcia (1995); United States: Historical Statistics of the United States (2007).

While slave prices rose across all three major slave economies in the Americas, Figure 6 shows Brazil experienced the steepest jump. Despite booming coffee and sugar demand, Brazil's heavy reliance on the Atlantic slave trade, along its widespread use of enslaved labor in low-productivity urban retail and food production, pushed labor costs up more sharply in the short run. Consequently, between 1850 and 1860 the consumer price index rose by 11.1 percent in the United States, 26 percent in Britain, 25 percent in Spain, but surged 63 percent in Brazil (Officer 2007; Bergad, García, and Barcia 1995, 56). These trans-American ripple effects, and the lack of any parallel expansion in sugar output in the Northeast, suggest that the supply shock, in addition to higher demand, explains the higher slave-price rise in Brazil during the 1850s.

#### **4 The Normalization of Food Supply after the 1850s**

New price and slave-price series show that Brazil's economy adapted after the 1850s shock. Rising slave costs encouraged regional food-production specialization, halting food-price inflation in the 1860s. Amilcar and Roberto Martins demonstrate that, while coffee production in the in the Paraíba Valley concentrated most of the enslaved labour force during the early 1870s, many were diverted to food cultivation in less productive areas, such as central-west São Paulo and southern Minas Gerais (Filho and Martins 1983, 547). Hebe Mattos de Castro also documents a growing commercial slave sector in a nonplantation region of Rio de Janeiro during the 1850s that was producing food for the urban market (Castro 2009).

Another key but overlooked food-producing region was the new immigrant settlements in southern Brazil (Nogueról 2016, 168). Sebastião Soares, writing on the 1850s scarcity, called Santa Catarina and Rio Grande do Sul the “main granaries” for Rio de Janeiro, Bahia, and Pernambuco (Soares 1860, 138). Government reports confirm this shift: an 1854 bulletin from Rio Grande do Sul's government noted that “extraordinary price increases for agricultural products have spurred farmers to ex-

pand production, especially of corn, year after year.” Like many observers, officials blamed the slave-trade’s end for the labor shortage, though they also cited northeastern droughts. As the report concluded, northern coffee and sugar planters “sought to employ the workers they had exclusively in the production of these two valuable items, leading to a gap in the production of foodstuffs, which has caused the price increase.”<sup>6</sup>

Provincial records provide various pieces of evidence that the new immigrant settlements drove Rio Grande do Sul’s food-output boom. An 1849 report shows São Leopoldo, a German colony founded in 1824, as the leading producer of beans, cassava, and corn, despite virtually no exports to other provinces at that time.<sup>7</sup> However, reconstructed export data (1846–1876) reveal a rapid increase in the 1850s. Annual shipments of beans rose from under 1,000 to 26,000 sacks per year, and corn from under 1,000 to 31,000 sacks. Most of this growth originated in settlements established around 1850 (see Appendix D).

Porto Alegre emerged as the chief port for exporting food to Rio de Janeiro, reflecting settlement concentrations in the northern part of the province. Government reports reveal regional specialisation, as exports of hides and beef jerky moved mainly through the southern port of Rio Grande. While slaves laboured in the immigrant settlements, the records show that free farmers accounted for most production.

To assess Rio Grande do Sul’s effect on Rio de Janeiro’s food market, Appendix E estimates its export impact. Drawing on consumption surveys for black beans (Table 5), a back-of-the-envelope calculation shows that between 1858 and 1875 those exports could have supplied roughly 20 percent of Rio de Janeiro’s population, a substantial share.

Food output also expanded in the neighboring province of Santa Catarina. An 1854 provincial report notes that, since 1852, production had “some development” and

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<sup>6</sup>Official Publications: Relatório Presidente, Rio Grande do Sul, 1854, p.46.

<sup>7</sup>Official Publications: Relatório Presidente, Rio Grande do Sul, 1849, Mappa n<sup>o</sup>13.

was “quite promising and consistent compared with crop yields.”<sup>8</sup> During the 1850s, smallholders, growing manioc flour, beans, and corn, benefited from high prices ‘due to their demand in the northern provinces of the empire’.<sup>9</sup> Although Santa Catarina’s bean and corn exports lagged behind Rio Grande do Sul’s, its manioc-flour shipments averaged 200,000 sacks annually, versus just 4,000 in Rio Grande do Sul.

A common way to evaluate whether food supply managed to stabilize prices and preserve the purchasing power of the population is through real wages. Using welfare-ratio methods popularized by Robert Allen, Table 5 applies a 1857 three-meal basket (lunch, dinner, and supper) sourced from the Porto Alegre police force. This basket includes all staples consistently documented for nineteenth-century consumption and uniquely provides both quantities and prices for food during the 1850s (see Appendix C). The data for Porto Alegre show that the prices listed in Rio de Janeiro newspapers are representative, as the overall cost of the basket in 1857 was 325 reis per day in Porto Alegre and 342 in Rio de Janeiro.

The daily 3,356 kcal in Table 5 exceeds the standard welfare-ratio baskets used elsewhere and, despite surpassing average Brazilian (especially enslaved) intake, its composition more accurately reflects local diets than Allen’s Europe-based benchmarks (Allen, Murphy, and Schneider 2012). The most important difference is Brazil’s high meat consumption during the nineteenth century. For example, Rio de Janeiro’s 1869 immigrant hostel (*hospedaria*) records show that, of 8,617 adult rations that year, bread (32.2%) and meat (28%) alone accounted for over half of total expenses, with sugar (9%), rice (9%), lard (6.4%), coffee (5.6%), beans (4%), and firewood (9.6%) making up the rest.<sup>10</sup>

Figure 7 plots wages for the city of Rio de Janeiro divided by the cost of the consumption basket from Table 5, using the data collected for the new price index. After a downturn in the early 1850s, real wages experienced an improvement in the subse-

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<sup>8</sup>Official Publications: Relatório Presidente, Santa Catarina, 1854, p.27.

<sup>9</sup>Official Publications: Relatório Presidente, Santa Catarina, 1860, p.26-8.

<sup>10</sup>Official Publications: Ministério da Agricultura, 1870, tabela n.7

Table 5. Annual consumption basket, 1857

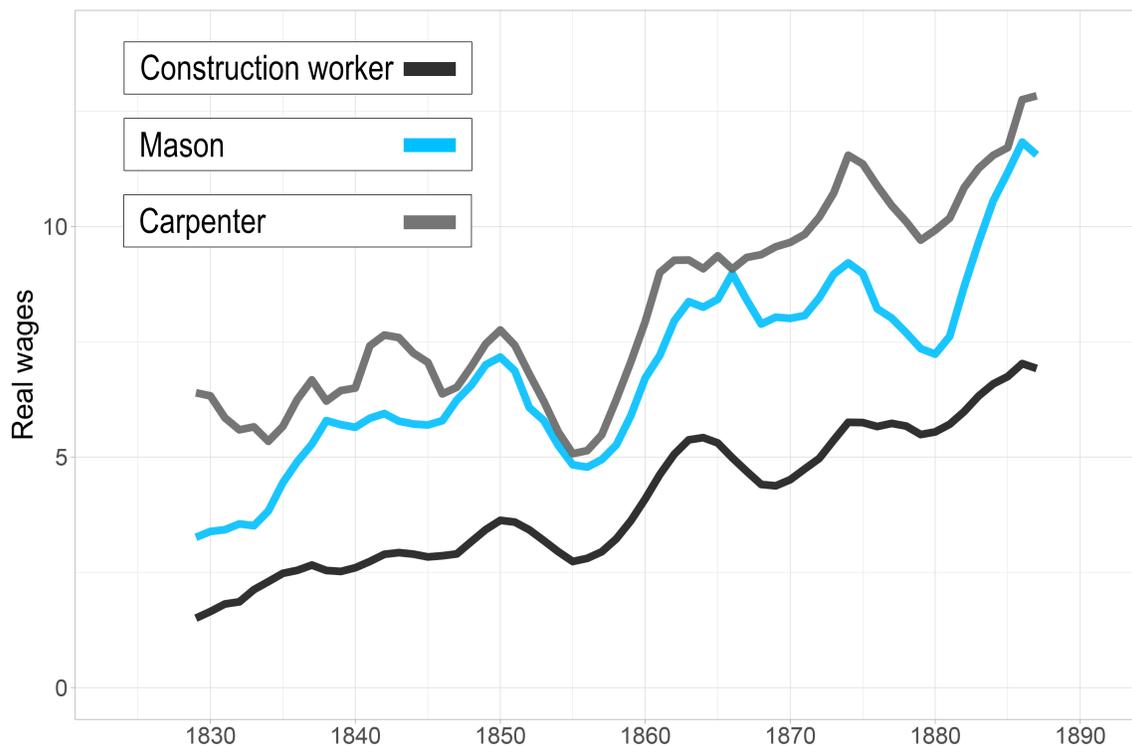
Product	Quantity	Share, 1857 prices	Calories (kcal)	Calories (100 g) reference
Black beans	66.97 kg	7.1%	488	266 (BRC0275T)
Rice	20.94 kg	6.8%	62	108 (BRC0016A)
Corn	31.41 kg	3.7%	83	97 (BRC0138A)
Manioc flour	36.50 kg	7.1%	351	351 (BRC0088B)
Bread (wheat flour)	62.81 kg	18.5%	422	244 (BRC0145A)
Beef jerky	188.44 kg	32.3%	1,409	273 (BRC0081F)
Bacon ( <i>toucinho</i> )	15.70 kg	7.1%	258	599 (BRC0169F)
Sugar	26.17 kg	6.2%	283	395 (BRC0044K)
Coffee	5.23 kg	2.8%	–	–
Firewood	–	6.2%	–	–
Vegetables	–	2.5%	–	–
Cotton fabrics	5 meters	–	–	–
Total per day	–	–	3 356	–

Source: Calories from *Composição de alimentos, Tabela Brasileira de Composição de Alimentos (TBCA)*, Universidade de São Paulo (USP), Food Research Center (FoRC), Versão 7.2 (2023).

<http://www.fcf.usp.br/tbca>.

quent decades, interrupted only by downturns during the Paraguayan War (1864–70) and again in the late 1870s. Despite these fluctuations, there is no evidence that food-price shocks caused sustained stagnation in real incomes. Wage growth before 1850 also contradicts the estimates in the Maddison project, which assume (i.e. without direct observations) that there was no growth in per capita income in Brazil during the first half of the nineteenth century (Prados De La Escosura 2009).

Figure 7. Real wages in Rio de Janeiro (1827-89, 5-year moving averages)



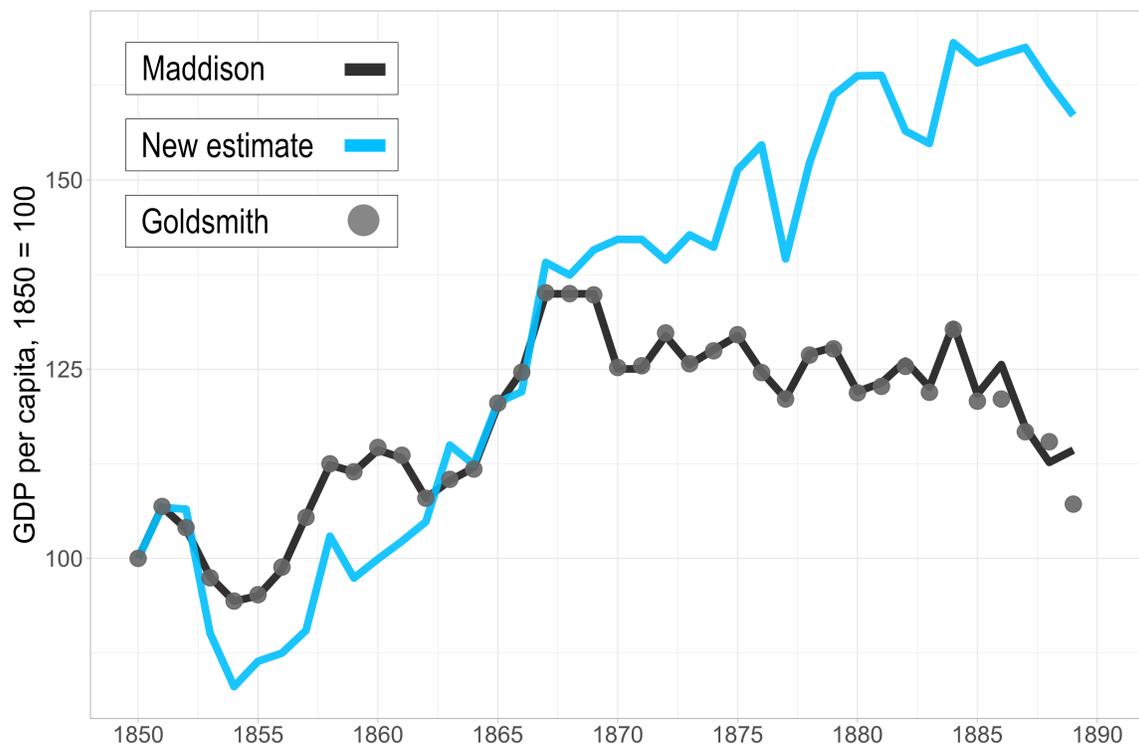
Sources: Nominal wages (annual averages) from Lobo (1978, p.803). Cost of the consumer basket from Table A2, in the Appendix.

Contrary to Leff’s claim, the evidence shows Brazil’s food supply was responsive to changes in market prices. The increase in food prices during the 1850s created incentives for interprovincial trade and encouraged regional diversification. As an 1862 Rio Grande do Sul provincial report noted, agriculture there “expanded beyond beans, corn, and manioc flour, which were taken and consumed solely in the Provinces of the Empire.” Farmers diversified because those staples did not always “fetch prices that cover the costs of production and transportation’ due to the ‘abundance’ in the provinces that typically imported them.<sup>11</sup> This demonstrates that different provinces increased food production in response to the price shock of the 1850s.

<sup>11</sup>Official Publications: Relatório Presidente, Rio Grande do Sul, 1862, p.125.

Rising real wages for skilled workers in Rio de Janeiro challenge the supposed nineteenth-century stagnation of Brazilian per-capita income. As shown above, stagnation is a statistical illusion caused by inflated price indices. Even recent attempts to revise Brazil’s nineteenth-century GDP still rely on those indices, blending them to yield more plausible series, but continue to report growth rates below the Latin American average. Figure 8 shows that Brazil’s “growth puzzle” vanishes when Goldsmith’s nominal GDP series, the basis for the Maddison Project estimates, is deflated with the new price index. The lower inflation rate lifts annual per-capita income growth from 0.3 to 1.19 percent, aligning Brazil with the Latin American average (see Table 1).

Figure 8. GDP per capita in Brazil



Sources: Maddison project database (2023); Goldsmith (1986).

## 5 The Role of External Factors

Although the 1858 commissioners identified higher slave prices as the chief driver of rising food costs, they also acknowledged several other contributing factors. The commissioners added that inflation was not unique to Brazil; prices of imported industrial goods abroad had increased steadily in the six or seven years preceding their inquiry. One rapporteur traced these overseas pressures to five European developments: 1) rising consumption across social classes; 2) large railway and related projects that drew off labor; 3) poor harvests; 4) the Crimean war; and 5) the rapid growth of gold mining, ‘to which some writers attribute a decisive influence on price increases.’<sup>12</sup>

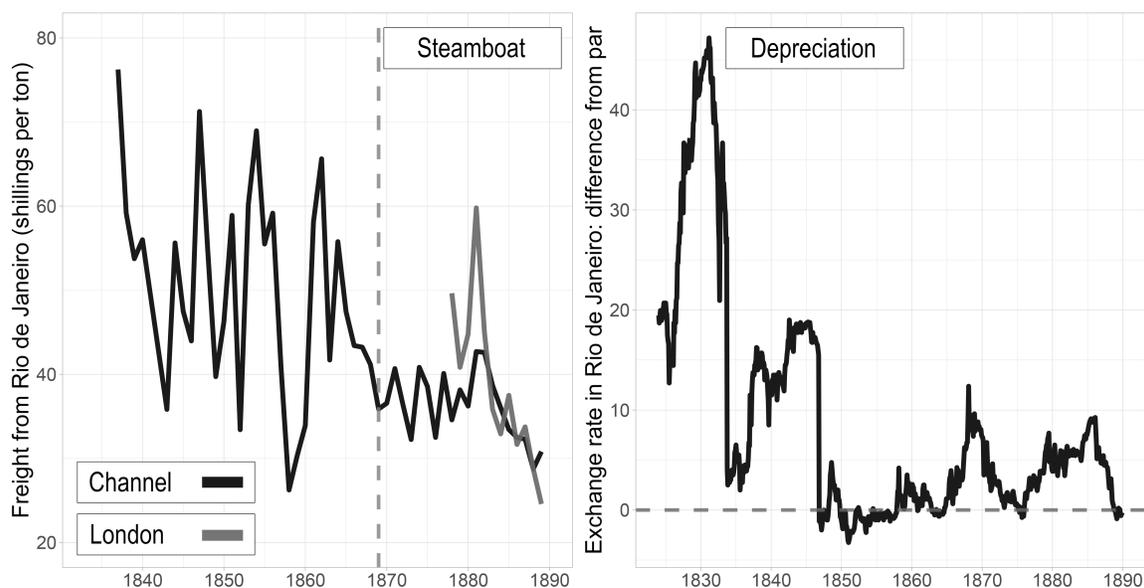
Foreign trade transmits price pressures to Brazil through three channels: higher export-country prices, dearer ocean freight, and exchange-rate fluctuations. Product-level series in the online appendix reveal that, among the main imports in Table 4, only wine shows a sharp price increase in the 1850s. Cotton textiles remained stable, while items such as butter and codfish rose only gradually over several decades.

Figure 9 shows new monthly series for freight rates from Rio de Janeiro to the English Channel (canal da Mancha) and to London, together with the Rio–London exchange rate. Before this paper, the only maritime freight series available for Brazil was that of Angier (1920), but the series only starts in 1869. The right-hand panel plots the exchange-rate premium (ágio) over the currency’s official metallic value. Because Brazil’s gold standard lacked convertibility, excessive paper money issuance caused the mil-réis to depreciate. This is clearly during the final years of Dom Pedro I (1827–31), when fiscal overspending expanded the note supply. This depreciation also explains the uptick in import prices seen in Figure 4.

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<sup>12</sup>Official Publications: Relatório Presidente, Rio de Janeiro. 1858, p.164.

Figure 9. Freights and exchange rate deviation from par (mil-reis / pound sterling) in Rio de Janeiro



Sources: *Jornal do Commercio* (several years).

Notes: Freight rates are annual averages (1837-89). Newspapers quoted freight rates by weight, not by commodity.

The exchange rate premium enables us to perceive the instances when the government adjusted the parity to bring it closer to the equilibrium rate. In October 1833 the government reduced the parity from 67.7 to 43.5 pence per mil-réis; a further step in November 1846 lowered it to 27 pence, where it remained for the rest of the Empire. Because no additional depreciation occurred in the 1850s, exchange-rate movements cannot explain the era’s import-price behavior. Product-level data in the appendix confirm that most import prices did not have a sudden increase during that decade.

Figure 9 also shows no substantial shift in freight rates during the 1850s that could explain higher import prices. A clear change appears only after 1870: volatility drops, and average freight costs fall by about 36 percent. One likely cause is the spread of steamships in British commerce from 1869 onward (Pascali 2017, 2828). Although sailing vessels remained common, steam’s growing share appears to have driven the

steadier, lower freight rates, especially in the 1880s.

Trade policy also mattered. During the imperial period, the most significant trade policy was the Alves Branco reform, which practically doubled the average import tariff in 1844. However, evidence shows that the quantity and prices of imported cotton fabrics, Brazil's main import product, were not affected by the reform. Gains in British productivity and the decline in textile prices outweighed the effects of the tariff (Pereira 2021).

## 6 Conclusion

In a series of influential studies, Nathaniel Leff (1997, 43) argued that, unlike many countries, Brazil endured chronic nineteenth-century inflation. This view formed the basis for the long-accepted narrative of economic stagnation, seemingly confirmed by the main price indices. Yet the series from Lobo, Buescu, and Goldsmith overstate inflation and portray prices as rising without interruption in the late nineteenth century. New evidence, however, shows no consistent upward trajectory after the mid-nineteenth century; prices fell in the late imperial period.

According to Leff, the root cause of Brazil's persistent inflation was the inelasticity of its food supply. The evidence presented in this study, however, does not support this interpretation. Government reports from Rio Grande do Sul and Santa Catarina record a rapid increase in shipments of basic foodstuffs to Rio de Janeiro after 1850, confirming earlier studies that emphasize active inter-provincial trade. Provincial slave-price series, together with contemporary debates in newspapers and parliament, show that labor costs increased in the early 1850s but levelled off after the 1860s. Taken together, these data indicate that producers expanded output in direct response to higher slave prices. The slowdown in price growth cleared the way for per-capita income to rise.

Early price-index builders tackled the “low-hanging fruit” of customs data and widely spaced benchmarks; only later did scholars undertake labor-intensive newspaper and institutional searches, broaden commodity coverage, apply national weights, and extend price collection beyond Rio to provinces such as Pernambuco and Bahia. Decades of research have sharpened our view of nineteenth century Brazilian inflation, but gaps remain, above all the near-absence of service prices (especially housing), which leaves current, commodity-heavy indices vulnerable to bias and marks service-price reconstruction as the next research priority.

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Omitted from this version.

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